## AD NUMBER

**AD872270**

## NEW LIMITATION CHANGE

TO

**Approved for public release, distribution unlimited**

FROM

**Distribution: Further dissemination only as directed by US Army Test and Evalustion Cpmmand [USATECOM], Aberdeen Proving Ground, MD 21005; 14 May 1970 or higher DoD authority.**

## AUTHORITY

**USATECOM, ltr, 14 Dec 1970.**

14 May 1970

U. S. ARMY TEST AND EVALUATION COMMAND
COMMON SERVICE TEST PROCEDURE

# INFANTRY WEAPONS AND AMMUNITION SAFETY



## 1. OBJECTIVE

The objective of this Materiel Test Procedure (MTP) is to present the service test procedures required to confirm that a test item and associated materials are safe for use by the soldier in the field, and meet the safety criteria established in the applicable materiel documents.

## 2. BACKGROUND

Equipment is of no value if it is unsafe for the soldier to use. It is for this reason that in service testing special emphasis is placed on the evaluation of the safety aspects of the test item during operation and maintenance. This evaluation should be designed to confirm whether:

a. Maximum safety consistent with military operational requirements has been designed into the system and individual equipments.

b. Adequate controls over known hazards, inherent to the test item(s), are established to protect personnel, equipment, and property.

c. Minimum risk is involved in the acceptance and use of the test item(s).

d. Hazards associated with each system, subsystem, assembly or equipment can be identified and corrected, if possible, in an expeditious manner.

e. Limitations are placed on use of the equipment in the field because of safety restrictions.

## 3. REQUIRED EQUIPMENT

The evaluation of the safety features of the test item generally will not require special tools or equipment other than those normally accompanying the test item.

## 4. REFERENCES

A. TB MED 251, Noise and Conservation of Hearing.
B. Military Standard 1472, Human Engineering Design Criteria for Military Systems, Equipment and Facilities.
C. AR 385-16, Safety for Systems, Associated Subsystems, and Equipment.
D. AR 385-30, Safety Color Codes, Markings and Signs.
E. AR 385-63, Regulations for Firing Ammunitions for Training, Target Practice, and Combat.
F. AMCR 385-12, Verification of Safety of Materiel from Development through Testing, Production and Supply to Disposition.
G. AMCR 385-24, Range Safety.
H. USATECOM Reg 385-2, Safety Responsibilities.
I. USATECOM Reg 385-6, Verification of Safety of Materiel During

Testing.
J. USATECOM Reg 385-11, Waivers, Exemptions, and Authorization for Deviations from Safety Regulations.
K. FM 5-25, Explosives and Demolitions.
L. FM 20-32, Land Mine Warfare.
M. FM 23-30, Grenades and Pyrotechnics.
N. TM 3-366, Flame Fuels.
O. TM 9-1300-203, Artillery Ammunition.
P. TM 9-1300-204, Ammunition for Recoilless Rifles.
Q. TM 9-1305-200, Small Arms Ammunition.
R. TM 9-1370-200, Military Pyrotechnics.
S. TM 9-1900, Ammunition, General.
T. TM 9-1903, Care, Handling, Preservation, and Destruction of Ammunition.
U. TM 9-2210, Small Arms Accidents, Malfunctions, and Their Causes.
V. TM 38-250, Packaging and Materials Handling, Packaging and Handling of Dangerous Materials for Transportation by Military Aircraft.
W. Other field manuals and technical manuals applicable to specific test and control items.
X. MTP 3-2-811, Noise and Blast Measurement.
Y. MTP 3-3-521, Human Factors Engineering.
Z. MTP 4-3-514, Safety Hazards.
AA. MTP 7-3-511, Air Drop Operations - Personnel and Individual Equipment.
AB. MTP 10-1-002, Field Combat Test Exercises.
AC. Local safety regulations and SOP's.

## 5. SCOPE

### 5.1 SUMMARY

This materiel test procedure outlines a series of safety procedures, checks, and inspections to be applied on a selective basis depending on the item tested. Adherence to these procedures will ensure safe conduct of the service test. The cumulative results will allow an estimate to be made of the safety aspects pertinent to the equipment tested, and provide a basis for the Safety Confirmation required by AR 385-16, AMCR 385-12, AMCR 385-24, and USATECOM Reg 385-6. Because of the variety of equipment which may be subjected to service testing, all of the steps listed below may not apply. It will be the responsibility of the test officer to ascertain those which are applicable and to add specific procedures and inspections required by the nature of the item being tested.

Each of the applicable safety guards and procedures listed below will be considered in all phases of the service test.

a. Safety Statement -- the statement issued by the developer outlining the tests to which he has subjected materiel and the results thereof with respect to operational limitations and hazards to personnel involved in

the use of the materiel.

b. Safety Release -- a statement issued by USATECOM, based on engineering safety test evaluation and/or developer's safety statement, outlining the operational limitations and specific hazards peculiar to a system or components thereof.

c. Safety Evaluation -- an assessment of safety characteristics, deficiencies and precautionary measures other than Safety Statement and Safety Release.

d. Safety Procedure(s) -- detailed local Standard Operating Procedures (SOP) applicable to testing or using of specific types of weapons and/or munitions by personnel, and/or specific procedures prescribed in Safety Release.

e. Observations, Checks, and Inspections -- those steps to be followed by test or using personnel to determine the safety characteristics of test materiel.

5.2 LIMITATIONS

This MTP does not include safety testing of chemical and biological equipment. Safety aspects of CB items are treated in MTP 8-3-506.

6. PROCEDURES

6.1 PREPARATION FOR TEST

a. The test officer shall make a pretest safety evaluation of the test materiel based on the following:

1) A preliminary study of the safety release to identify restrictive or limiting safety hazards inherent in the item being tested.
2) Identification of safety hazards for which special precautions must be taken.
3) Review of safety precautions contained in preliminary operating and instruction manuals.
4) Review of safety aspects of safety statements by the developer's engineer design test reports, and engineering test reports when available.
5) Review of safety precautions contained in applicable references, paragraph 4.
6) Selections of a safe test site.
7) Consultation with a safety officer in devising safety procedures to be followed in testing.

b. The Program Of Instruction (POI) for the service test will include sufficient instruction on safety to thoroughly acquaint the test soldiers with the hazards present, and to alert them to possible hazards which may develop.

c. In addition to the support requirements established for the service test, i.e., test soldiers, supplies and equipment, the test officer will insure that an adequate supply of safety equipment is available for the

test. This includes, but is not limited to, protective clothing, protective masks, head and body armor, first-aid medical supplies, sand bags, warning signs, alarms, and other safety devices.

d. When indicated by the nature of the test, advance arrangements shall be made for obtaining prompt professional medical assistance and professional fire fighting support.

e. Subsequent to the pretest safety evaluation, paragraph 6.1.a.1) and identification of hazards peculiar to the commodity under test, a safety check list will be prepared for guidance of supervisory and test personnel during conduct of the service test. The check list will include (1) brief directives pertaining to mandatory safety procedures (paragraph 6.2.2), (2) reminders and/or questions pertaining to specific types of hazards peculiar to the commodity under test for which tests or inspections should be made (paragraph 6.2.3), and (3) reminders and/or questions pertaining to miscellaneous potential hazards developed under paragraph 6.2.3.3 and Appendix A.

## 6.2 TEST CONDUCT

### 6.2.1 Safety Release

a. The test officer will study the Safety Release issued in accordance with USATECOM Reg 385-6 to determine any limitations on the use of the test item due to safety restrictions. A preliminary study will be conducted before operational testing begins.

b. The Safety Release will be reviewed to determine whether it places undue restrictions on the tactical use of the test equipment.

c. Throughout each phase of the test, data pertinent to safety and verification of limitations cited in the Safety Release will be collected. These data will serve as a basis for the Safety Confirmation required by USATECOM Reg 385-6.

### 6.2.2 Safety Procedures

#### 6.2.2.1 Safety Regulations

Test personnel will comply with safety regulations of higher headquarters and local safety regulations and SOP's.

#### 6.2.2.2 Safety Procedures and Precautions

The safety procedures and precautions listed below will be observed when applicable.

a. Protective Measures for Test Personnel. The following protective measures will be employed in the circumstances described:

1) Sandbags, or other safety emplacements, will be used by gun crews and exposed personnel during the firing of all test weapons, test ammunition, or pyrotechnics, as well as in

firing standard items of these types, when danger exists of fragments reaching gun crews or other personnel. Examples of dangerous type situations are prematures, short rounds, graze-impact sensitivity tests, short range firings against armor plate, and tests wherein the nature of the ammunition used involves danger from fragments.

2) When firing weapons which have a dangerous back-blast, the danger area will be plainly marked with white tape.
3) Safety glasses will be worn when firing all small arms test equipment, and at all times when firing spotting rifles.
4) The test detail will wear steel helmets and body armor when firing all types of explosive ammunition, including hand and anti-tank grenades, developmental weapons and ammunition, and pyrotechnics.
5) All personnel will wear approved ear protectors when engaged in, or when in close proximity to, firing tests of high velocity weapons, weapons characterized by a sharp back-blast or report, and small arms, as required by TB MED 251.
6) When test materiel is subjected to the required upper and lower environmental limits of heat and cold, particular attention will be directed to protection of the test personnel.

b. Precautionary Measures. The following precautionary measures will be taken in the circumstances described:

1) The most dangerous aspects of firing new developmental ammunition and weapons will be delayed until the characteristics of the weapon and ammunition have been determined during the less dangerous tests.
2) Test weapons, ammunition, pyrotechnics, and explosive items of undemonstrated dependability will be fired and/or detonated remotely. In such cases personnel will be protected by sandbags, dugouts, or other secure means.
3) When firing weapons, detonating explosive items, and participating in other dangerous test activities, the minimum number of individuals will be exposed. This requirement is particularly applicable during the removal of misfires from weapons or when marking duds. Personnel occupied in such work will employ all possible precautions including use of helmets, body armor, and other protective clothing.
4) When firing two or more weapons with test ammunition from one firing area, the distance between weapons will be greater than the effective bursting radius of the ammunition being fired.
5) Vehicles will be parked a safe distance from firing positions.
6) All flammable or explosive materiel or munitions must be kept the safe distance from open flames as stated in the TM or other supporting material.
7) Electrically initiated explosives and ammunition items are susceptible to premature initiation when subjected to

adequate static or induced electricity and radio-frequency energies. Applicable safety measures are outlined in Section 27, AMCR 385-24.

c. Munitions. The following precautions will be observed with respect to ammunition and other items of an explosive nature:

1) Ammunition and/or explosive items near firing points will be placed out of any back-blast or fragmentation area and will be located to minimize the possibility of ignition or detonation in the event of an accident at the firing position.
2) Ammunition and explosives will be handled carefully at all times. Safety tools (non-spark) are required for use in opening boxes of explosives.
3) Each round of ammunition will be inspected for burrs, dents, grease, dirt, rust, and other foreign matter prior to loading into a weapon or prior to firing.
4) All weapons, ammunition, pyrotechnics, and/or explosive items subjected to adverse conditions of dust, rain, heat, cold, rough handling, air drop, and immersion will be fired remotely until their safety following such conditions has been established.
5) Vehicle motors will be turned off while loading and unloading ammunition and/or explosives and during refueling operations.
6) In the event of a misfire when using test ammunition, no action will be taken until so ordered by the test officer. Misfires will be removed in accordance with prescribed procedures and special precautions applicable to the specific test round.
7) Any dud occurring during test firing will be immediately reported to the local Explosive Ordnance Disposal Detachment (EOD) for proper disposal. At no time will test personnel handle duds. In the event a dud occurs on a classified test round, the area will be guarded by test personnel until the dud has been destroyed or otherwise disposed of by authorized EOD personnel.
8) Smoking in the vicinity of munitions of any type is prohibited at all times. Specific areas marked with prominent signs and located a safe distance from firing lines, firing positions, and munitions will be designated for smoking.

### 6.2.3 Observations, Checks, and Inspections

#### 6.2.3.1 General

a. Throughout conduct of the service test, test personnel will continuously observe, check, and inspect for safety hazards. Tests which might create unsafe conditions will not be intentionally performed. However, adverse test conditions not covered in the approved service test plan may

appear to be needed during the process of testing, and applicable tests should be conducted with extreme caution.

b. Range Safety and Surface Danger Zone data should be evaluated for adequacy and inclusion in Safety Confirmation information recorded in the test report. Requirement referenced in AMCR 385-24.

6.2.3.2 Ammunition Hazards

When the test item is ammunition, applicable subjects in the following list of hazardous conditions will be included in the safety check list, paragraph 6.1.3). Additional entries and inspections keyed to the particular item under test will be made as deemed appropriate by the test officer.

a. General.

1) Moisture in sealed containers.
2) Illegible or improper marking.
3) Faultily constructed, inadequate, or damaged containers.
4) Dust, deterioration, or corrosion.
5) Excessive noise, blast, or recoil of ammunition-weapon system.
6) Dangerous secondary missiles produced by ammunition-weapon system.

b. Primers, Igniters, or Propellant.

1) Unburned residue in breech or tube.
2) Fire particles or sparks spewed from muzzle.
3) Misfires, hangfires, or cook-offs.
4) Loose primers or igniters.

c. Projectiles.

1) Burred, loose, or damaged rotating bands.
2) Extrusion of high explosive filler.
3) Short rounds, duds, or erratic flight.
4) Excessive area of fragmentation.

d. Cartridge Cases.

1) Excessive obturation.
2) Improper case ejection.
3) Ruptured cases.
4) Improper fitting to projectile.

e. Fuzes.

1) Early bursts.

2) Freezing or binding.
3) Misalignment of threads.
4) Loose fuzes.
5) Failure of fuze to be completely seated on the round.

6.2.3.3 Miscellaneous Hazards

In addition to the known hazards normally associated with certain types of equipment, particularly weapons systems, there are often less obvious hazards which may arise from inappropriate mechanical design or deficiencies in human factors engineering. Some typical hazards of this type which may occur in a wide range of equipments are pointed out in the questionnaire in Appendix A. This list is not all inclusive and should be augmented and amended by the test officer to accommodate characteristics of the particular item under test. Applicable items will be included in the safety check list, paragraph 6.1.a.4).

6.3 TEST DATA

6.3.1 Data Common to All Subtests

Evidence of unsafe conditions shall be supported by photographs, motion pictures, and/or video tapes.

6.3.2 Pretest Data

Sufficient data pertaining to the safety evaluation, training, logistical requirements, statistical considerations, and security shall be collected to provide background information to be used in analysis of the test results.

6.3.3 Safety Release

The following shall be recorded:

a. Any limitations on use of the test item due to personnel hazards and any undue hardships or restrictions on field use that safety limitations impose on conduct of service testing of the item.

6.3.4 Safety Procedures

The data shall be the entries pertaining to safety procedures and precautions contained in the check list, paragraph 6.1.4.

6.3.5 Observations, Checks, and Inspections

The data shall be as follows:

a. A description of any accidents or incidents having a bearing on safety.

b. A description of any special safety tests made, and test results.
c. The completed check list, paragraph 6.1.a.4).

6.4 DATA REDUCTION AND PRESENTATION

a. All data bearing on safety will be collated and reduced to a concise, meaningful form. These data will be analyzed to determine whether the test item met the established safety criteria. In this analysis, opinion will be separated from factual data and identified as such. Where opinion influenced the evaluation of factual data, this will be identified.

b. The evaluation of the safety aspects of the service testing will be presented as a portion of the test report. These data will also be used as a basis for the Safety Confirmation required by USATECOM Reg 385-6.

THIS PAGE INTENTIONALLY LEFT BLANK

# APPENDIX A

## MISCELLANEOUS HAZARDS QUESTIONNAIRE

1. Is the equipment designed so that the center of gravity and location of legs and supports make the equipment unlikely to tip over from unbalance or strong winds?

2. Are expandable and collapsible structures such as jacks, supports, masts, tripods, etc., free of projections, sharp edges, or design features which might be hazardous to personnel?

3. Are lifting rings provided for heavy equipment which is normally moved or lifted by machine?

4. Does the installation of equipment on vehicles provide sufficient mechanical strength to minimize potential safety hazards?

5. Are provisions made in vehicular installations for securing equipment, tools, and accessories during movements?

6. If a standard military vehicle has been modified to accommodate the equipment, is the vehicle still capable of satisfactory and safe operation?

7. Do doors and hinged covers have positive acting hold-open devices?

8. Are locking mechanisms for doors and drawers designed to prevent injury to the operator when the lock is released?

9. Is it evident when a cover is in place but not secured?

10. Is the equipment provided with suitable carrying handles?

11. Are handles recessed rather than extended where they might be hazardous?

12. Are handles positioned so they cannot catch on clothing or other equipment?

13. Are handles located over center of gravity whenever possible?

14. Are doors and other openings free of hazards from improperly designed catches, hinges, supports, fasteners, and stops?

15. Are heavy parts located as close as possible to load bearing structures, and as low as possible?

16. Is the weight distribution such that the equipment is easy to handle, move, or position?

17. When the equipment is to be manpacked, is the weight and configuration such that the combat effectiveness of the foot soldier is not jeopardized?

18. Is the equipment free of sharp or overhanging edges and corners that might cause injury to personnel?

19. When required, are provisions made for protection against eye hazards from flying particles?

20. Do instructions specify type of cleaning fluid and precautions to be taken when cleaning equipment?

21. Is protection provided against hot surfaces which might be dangerous to personnel?

22. When necessary, are ear and eye protective devices provided?

23. Is the ambient noise level acceptable for personal safety and efficiency?

24. Is the equipment provided with adequate and easily readable caution plates or labels to warn operating and maintenance personnel of potential safety hazards?

25. Are warning signs coded and colored in accordance with Army Regulations?

26. Are safety controls simple, easy to locate and operate, and positive locking?

27. Are the materials of which the test item is constructed sufficiently strong and durable to withstand combat use?

28. Are tools used with ammunition made of non-sparking material?

29. Does the overall design reflect adequate consideration of safety with respect to human factors?

30. Are potential miscellaneous hazards adequately treated in instruction manuals?

UNCLASSIFIED
Security Classification

## DOCUMENT CONTROL DATA - R & D

*(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)*

| | |
|---|---|
| 1. ORIGINATING ACTIVITY *(Corporate author)*<br>US Army Test and Evaluation Command (USATECOM)<br>Aberdeen Proving Ground, Maryland 21005 | 2a. REPORT SECURITY CLASSIFICATION<br>Unclassified<br>2b. GROUP<br>---------- |

3. REPORT TITLE

U. S. Army Test and Evaluation Command Materiel Test Procedure 3-3-517, Common Service Test Procedure, - "Infantry Weapons and Ammunition Safety."

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*
Final

5. AUTHOR(S) *(First name, middle initial, last name)*
----------

| | | |
|---|---|---|
| 6. REPORT DATE<br>14 May 1970 | 7a. TOTAL NO. OF PAGES<br>14 | 7b. NO. OF REFS<br>29 |
| 8a. CONTRACT OR GRANT NO.<br>DA-18-001-AMC-1045(R)<br>b. PROJECT NO.<br>AMCR 310-6<br>c.<br>d. | 9a. ORIGINATOR'S REPORT NUMBER(S)<br>MTP 3-3-517<br>9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*<br>---------- | |

10. DISTRIBUTION STATEMENT
This document is subject to special export controls and each transmittal to foreign governments or foreign nationals,-WITH THE EXCEPTION OF AUSTRALIA, CANADA, AND UNITED KINGDOM,-may be made only with prior approval of HQ,USATECOM.

| | |
|---|---|
| 11. SUPPLEMENTARY NOTES<br>---------- | 12. SPONSORING MILITARY ACTIVITY<br>Headquarters<br>US Army Test and Evaluation Command<br>Aberdeen Proving Ground, Maryland 21005 |

13. ABSTRACT

This Army Service Test Procedure describes test methods and techniques for evaluating Infantry Weapons and Ammunition to confirm that these items are safe for use by the soldier in the field, and that they meet the safety criteria established in the applicable materiel requirements documents.

DD FORM 1 NOV 65 1473 (PAGE 1)
S/N 0101-807-6811

UNCLASSIFIED
Security Classification

A-31408

UNCLASSIFIED
Security Classification

| 14 KEY WORDS | LINK A | | LINK B | | LINK C | |
|---|---|---|---|---|---|---|
| | ROLE | WT | ROLE | WT | ROLE | WT |
| Army Service Test | | | | | | |
| Infantry Weapons and Ammunition, Safety Provisions | | | | | | |
| Test Procedures | | | | | | |
| Test Methods and Techniques | | | | | | |

DD FORM 1 NOV 65 1473 (BACK)
S/N 0101-807-6821

UNCLASSIFIED
Security Classification
A-31409